he proposes to do in the present paper; in a subsequent paper he hopes to discuss the cases in which certain functions are discontinuous either within or at an extremity of the intervals within which they are considered. The paper was read at the December meeting, and within its limits appears to be a thorough discussion of the matter.—Another paper read at the December meeting is by C. L. Bouton, on some examples of differential invariants. It is founded on Lie's methods. The invariants are those occurring in projective transformations, and the treatment for the plane is given in full; the method for the corresponding solid problem is sketched in, and the results given. In the author's opinion all the invariants are new.—Papers read at the February meeting are on an extension of Sylow's theorem, by Dr. G. A. Miller.—Note on the tetrahedroid, by Dr. J. L. Hutchinson. The writer points out the connection between a certain quartic surface, discussed by him in the *Annals of Mathematics* (vol. ii. p. 158), and the abovenamed surface.—Note on integrating factors, by P. Sarel.—Early history of Galois' theory of equations, by Prof. J. Pierpont. This is a very interesting bibliographical paper, which treats of (1) Galois' relations to Lagrange, and (2) how Galois' algebraic theories became public. Galois' estimate of his discoveries is thus stated: "J'ai fait des recherches qui arrêteront bien des savants dans les leurs."—Reviews follow of Love's theoretical mechanics, of Schell's tortuous curves, and of Page's differential equations.—There are a few slight notes, and the useful list of mathematical publications.

Wiedemann's Annalen der Physik und Chemie, No. 3.—Conductivities of electrolytes, by F. Kohlrausch, L. Holborn, and H. Diesselhorst. The authors point out that the modern advances in the measurement of temperatures and resistances have made it necessary to redetermine the conductivities of electrolytes in terms of the units now adopted. As standard electrolytes they take solutions of sulphuric acid of density 1·223, magnesium sulphate of density 1·190, and sodium chloride saturated at 18°. The resistance of 1 cc. as a cube is 0·7398, 0·04922, and 0·21605 in the three cases, which represent the maximum conductivities of those salts at the temperature mentioned.—The foundations of the electric unit of resistance, by W. Jaeger and K. Kahle. The authors describe the methods adopted in the Physikalisch-Technische Reichsanstalt for purifying the mercury and calibrating the tubes of standard resistances. The tubes must be filled in a vacuum. The resistances show a secular diminution of about 0·00003 ohms in five years.—Absorption and emission of steam and carbonic acid in the infra-red spectrum, by H. Rubens and E. Aschkinass. The infra-red rays separated out by five successive reflections at fluospar surfaces are absorbed by carbonic acid and water vapour in thick layers. Their wave-length is about $24\,\mu$. Their absorption by the atmosphere accounts for their absence in the solar spectrum.—On the transparency of some liquids for rays of great wave-length, by the same authors. Water shows considerable absorption, but benzol is more transparent even than silver chloride.—On light nodes in a kathode ray bundle under the influence of a magnetic field, by E. Wiedemann and A. Wehnelt. When the lines of force are parallel to the axis of the tube, the kathode rays are twisted into a bundle having successive nodes. The phenomenon is completely in accordance with the projected-particle theory of kathode rays.—Visibility of Rontgen rays, by E. Dorn. Proves that the light effects seen are not due to an accommodation-strain or to electrical discharges in the neighbourhood of the observer's head.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 5.—"Observations on the Action of Anæsthetics on Vegetable and Animal Protoplasm." By J. B. Farmer, M.A., and A. D. Waller, M.D., F.R.S. Received March 9.

The object of the investigation was to observe simultaneously and comparatively the effects of certain anæsthetics (carbon dioxide, ether, and chloroform) upon vegetable and upon animal protoplasm.

Two gas chambers in series, through which anæsthetic and other vapours can be passed, contain: the first, a leaf of *Elodea Canadensis* under the microscope (× 300); the second, a sciatic nerve of *Rana temporaria* connected with an inductorium and galvanometer (or upon occasion a galvanograph).

The actual movements of chlorophyll bodies in a cell of the leaf were observed and measured by one observer, while the other took readings of the galvanometric deflections in response to excitation of the nerve. To establish comparison between the two classes of effects we took as measures:—the number of chlorophyll bodies that crossed a cobweb in the eye-piece during each successive minute, and the magnitude of galvanometric deflections at intervals of one minute, before, during, and after the action of the vapour. The number of bodies passing per minute gives measure of the rate of movement in the vegetable protoplasm, while the magnitude of successive galvanometric deflections gives measure of the mobility of the animal protoplasm.

The results obtained from a study of *Chara*, *Elodea*, and plasmodium of *Badhamia* were quite consistent, but owing to the greater ease in making a quantitative determination, *Elodea* was used for the more exact comparative experiments.

The action of carbon dioxide was to produce an initial slight acceleration, followed speedily by a complete cessation of movement. On disconnecting the CO_2 apparatus and aspirating air through the chamber the protoplasm, after the lapse of two or three minutes, began to show signs of recovery. Fitful movements of the granules first occurred, and then they soon resumed their processional motion around the cell; at first very slowly. The movement rapidly became accelerated and considerably exceeded the normal rate. This acceleration was not of long duration, and was followed by a slowing down to the ordinary speed.

The results of experiments with chloroform and ether were also given.

May 12.—"On the Connection of Algebraic Functions with Automorphic Functions." By E. T. Whittaker, B.A., Fellow of Trinity College, Cambridge. Communicated by Prof. A. R. Forsyth, Sc.D., F.R.S.

If u and z are variables connected by an algebraic equation, they are, in general, multiform functions of each other; the multiformity can be represented by a Riemann surface, to each point of which corresponds a pair of values of u and

Poincare and Klein have proved that a variable t exists, of which u and z are uniform automorphic functions; the existence-theorem, however, does not connect t analytically with u and z. When the genus (*genre*, *Geschlecht*) of the algebraic relation is zero or unity, t can be found by known methods; the automorphic functions required are rational functions, and doubly periodic functions, in the two cases respectively. But no class of automorphic functions with simply connected fundamental polygons has been known hitherto, which is applicable to the uniformisation of algebraic functions whose genus is greater than unity.

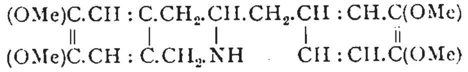
The present memoir discusses a new class of groups of projective substitutions, such that the functions rational on a Riemann surface of any genus can be expressed as uniform automorphic functions of a group of this class. Groups are first considered which can be generated by a number of real substitutions of period two, whose double points are not on the real axis, and whose product in a definite order is the identical substitution. A method is given for dividing the plane into curvilinear polygons corresponding to such a group; these polygons are simply-connected, and cover completely the half of the plane which is above the real axis. Sub-groups of these groups are found, whose genus is greater than unity, and which are appropriate for the uniformisation of any algebraic curves.

The sides of the polygons, into which the half-plane is divided, are formed of arcs of circles orthogonal to the real axis.

The analytical connection between the variables of the algebraic form and the uniformising variables is given by a differential equation of the third order. A certain number of the constants in this equation have to be determined by the condition that the group of substitutions associated with the equation leaves unchanged a certain circle. When any arbitrary values are given to these constants the solution of the differential equation is termed a quasi-uniformising variable. The properties of quasi-uniformising variables, and their relation to the uniformising variable, are discussed in the last section of the paper.

Physical Society, May 13.—Mr. Shelford Bidwell, President, in the chair.—A paper by Prof. W. E. Ayrton and Mr. T. Mather, on galvanometers, was read by Prof. Ayrton. It is a sequel to *Proc. Physical Soc.*, vol. x. p. 393, and to *Phil. Mag.*, vol. xxx. p. 58. The authors suggest that in future the comparative sensitiveness of galvanometers should be expressed in terms of the number of millimetre scale-divisions per micro-ampere, when the observed image or "spot" is one metre from the mirror. Unit angular deflection is therefore 1/2000 of a radian. Further, for the periodic time, *i.e* the time between two transits of the "spot" across some fixed point on the scale, in the *same* direction, the standard should be ten seconds. It is also proposed to reduce the factor of sensitiveness, as regards resistance, to the common basis of one ohm. The assumption is that, for a given galvanometer, the deflection per micro-ampere is proportional to the 2/5 power of the resistance of the windings. Tables accompanying the paper give complete data for a large number of galvanometers constructed during the past ten years, and it is possible to trace the improvements in sensitiveness throughout that time. The most sensitive galvanometers are the oscillographs, they have very short periods; the moving parts are small, the controlling fields very strong. They are designed to indicate the character of rapidly-varying currents. An oscillograph, as improved by Mr. Duddell, was exhibited; its period is 0·0001 sec., and its factor of sensitiveness, according to the authors' classification, is greater than any yet obtained. A distinction is drawn as to the use of the term "dead-beat." Maxwell applies it to galvanometers in which the motion is "aperiodic," *i.e.* to those in which the suspended system, before coming to rest, passes only *once* through the position of equilibrium. This meaning is retained; it is not to be confused with "quick-moving" or "short-period." A pendulum illustrating these distinctions was exhibited. As regards insulation of galvanometers and shunt-boxes, the authors now apply the "guard-wire" principle of Mr. W. A. Price. The instrument to be insulated is enclosed in a metal case provided with a terminal, to which one end of the windings is connected. The second end of the windings passes out through an ebonite bush-piece. This arrangement is said to nullify leakage and to prevent electro-static disturbance of the suspended system. In the second section of the paper, the authors calculate the limiting sensitiveness of galvanometers of the "Thomson" type. The investigation is based upon Prof. Schuster's B.A., 1894, paper; it takes into account the period of the suspended system, and the specific magnetisation of the needle. Lastly, the authors discuss the relative merits of long and short periods, *i.e.* the best "control," for galvanometers intended to indicate zero points in potentiometer operations. They conclude that if the control can be readily altered, and if the sensitiveness can be adjusted for the test, then, for rapidity of working, the "control" should be so adjusted that the sensitiveness is approximately two or three times greater than is absolutely needed for the desired accuracy. Prof. Threlfall thought the authors' method of comparing galvanometers very misleading. The results obtained in their comparison of the oscillograph (3,310,000), and the suspended-coil galvanometer (27) might be regarded as the *reductio ad absurdum* of the proposed system. The absurdity arose from the dissimilarity of the two instruments. Moreover, the proposed system ignored the fact that sensitiveness may be obtained by optical as well as by electro-magnetic means. Optical sensitiveness, owing to its greater stability, was to be preferred to electro-magnetic sensitiveness. The fundamental problem in the construction of galvanometers is an optical one; it is necessary to decide the mass and dimensions of the suspended parts so as to ensure (1) optical accuracy, and (2) electro-magnetic sensitiveness. Thus, to some extent, the weight of the mirror determines the thickness of the suspension. As an instance of what might be done by optical methods Prof. Threlfall referred to work done by himself and Mr. Brearley. (*Phil. Mag.*, 1896), in which it was possible to measure to $1·48 \times 10^{-13}$ amperes, and, with special refinements, to 3×10^{-14} amperes. He had found that the best diameter for glass mirrors was 1·1 cms., with a weight just under 0·5 grammes. These were used with a scale at 276 cms., read by a microscope to 0·04 m.m. The course of the light was: lamp, large lens, small scale, mirror, eye-piece. The period was 25 secs., and the resistance 50,000 ohms. Even better results could be obtained by using mirrors of quartz or of blood-stone. Quartz is incomparably to be preferred to glass. Such figures indicated what could be done by optical sensitiveness, the sensitiveness that the authors ignored. It was pointed out by Prof. Threlfall that the controlling field for galvanometers of the "Thomson" type should be straight and uniform. This was best secured by using two magnets, one above and one below the needles. Prof. Perry said the authors had not asserted that a galvanometer with higher figure of merit, according to their classification, was *superior* to another of lower figure. It must be agreed that the figure they obtain is a very valuable datum for the comparison of instruments designed for similar purposes; for instance, in classifying those used by Prof. Threlfall. Mr. Duddell was to be congratulated on the extreme sensitiveness and small period of his oscillograph. Prof. Ayrton, referring to Prof. Threlfall's *reductio ad absurdum*, admitted that the criticism would carry some conviction if the two instruments were of different kinds; if, for instance, one possessed a suspended needle and the other a suspended coil. But the argument failed, because both instruments were of the suspended-coil type. In one of them Mr. Duddell had developed the advantages to be gained by reducing the air-gap. To form an opinion of electro-magnetic improvements in galvanometers it was necessary to reduce the results of all instruments to some system of classification. There was no objection, after that, to adding a good mirror, and reading by a good microscope.—The President proposed votes of thanks to the authors, and the meeting adjourned until May 27.

Chemical Society, May 5.—Prof. Dewar, President, in the chair.—The following papers were read:—The action of hydrogen peroxide on carbohydrates in the presence of iron, by C. F. Cross, E. J. Bevan, and C. Smith. The authors show that the presence of iron salts is necessary to cause the oxidation of hexoses and cane-sugar by hydrogen peroxide; the hydrogen peroxide causes a constitutional change in the hexose molecule yielding products containing the group C(OH) : C(OH). Dicarboxylic acids are produced as the result of secondary reactions.—Note on the oxidation of certain acids in presence of iron, by H. J. H. Fenton.—Properties and relationships of dihydroxytartaric acid. Part ii. Metallic salts, by H. J. H. Fenton. The salts of dihydroxytartaric acid with the alkali metals are now described.—The affinity-constants of dihydroxymaleic, dihydroxyfumaric, dihydroxytartaric and tartronic acids, by S. Skinner. On comparing the affinity constants of maleic, malonic, succinic, fumaric, tartaric, dihydroxymaleic, dihydroxyfumaric, dihydroxytartaric and tartronic acids, it appears that the affinity constant increases on introducing hydroxyl groups, and is greater for the lower members of the series of dibasic acids; the unsaturated acids have larger affinity constants than their saturated isologues.—Note on the enolic and ketonic forms of ethylic acetoacetate, by R. S. Morrell and J. M. Crofts.—The resolution of tetrahydropapaverine into its optically active components, by W. J. Pope and S. J. Peachey. The constitution which Goldschmeidt has attributed to papaverine indicates that tetrahydropapaverine has the constitution



$$\begin{array}{l}(\mathrm{OMe})\mathrm{C.CH:C.CH_2.CH.CH_2.CH:CH.C(OMe)}\\ \qquad\quad \| \qquad\quad | \qquad\quad | \qquad\qquad\quad | \qquad\qquad \| \\ (\mathrm{OMe})\mathrm{C.CH:C.CH_2.NH} \qquad \mathrm{CH:CH.C(OMe)}\end{array}$$

The authors confirm Goldschmeidt's constitution for papaverine by showing that the tetrahydro-derivative is racemic, and have isolated the dextro- and lævo-isomerides by means of their salts with dextrobromocamphorsulphonic acid.—Molecular weights of permanganates, perchlorates, and periodates in solution, by J. M. Crofts. Molecular weight determinations of permanganates, perchlorates and periodates in fused Glauber's salt indicates that these salts have the molecular composition $M'MnO_4$, $M'ClO_4$ and $M'IO_4$.—The action of chlorine on pyridine, by W. J. Sell and F. W. Dootson. Amongst other products an addition compound of pyridine and chlorine is formed during the action of the latter upon the former.—The oxidation of paranitrotoluenesulphonic acid to dinitrostilbenedisulphonic acid and to paranitrobenzaldehydorthosulphonic acid, by R. Herz and W. H. Bentley.—Determination of molecular weights: modification of Landsberger's boiling-point method, by J. Walker and J. S. Lumsden.

Royal Microscopical Society, April 20.—Mr. E. M. Nelson, President, in the chair.—Mr. Rousselet exhibited and described a metal lamp chimney made by Mr. Pillischer, and having two openings to carry white and tinted glass.—The President exhibited and described a new monochromatic light screen trough of American invention.—Mr. H. G. Madan read a paper "On some organic substances of high refractivity available for mounting specimens for examination under the microscope." Mr. White asked if these media were suitable for histological work. Mr. Madan said piperine and quinodine had been found harmless, monobromonaphthaline and phenylthiocarbimide were not likely to injure even delicate tissues, but he thought the mixture of metacinnamene and phenylthiocarbimide approached most nearly to balsam in permanency and neutrality. Dr. Dallinger said he had specimens mounted in nearly every medium which had been mentioned, but at the present time only one of these slides was in good condition; nevertheless, it was most important that such media should be available. The President referred to a table of coefficients which he had worked out to show the comparison of the refractive indices and dispersive powers of these new media with those of some well-known glasses.—Mr. Morland exhibited about three dozen slides of diatoms.—Mr. J. J. Vezey read a short note by Mr. E. B. Stringer, supplementary to his paper on photomicrography which was read at the meeting of the Society in December last.

Mathematical Society, May 12.—Prof. Elliott, F.R.S., President, in the chair.—Mr. A. E. H. Love, F.R.S., gave an account of some fundamental properties of manifolds.—Lieut.-Colonel Cunningham, R.E., communicated a description of "the 77 squares puzzle," by Major Turton, R.E., and exhibited a cardboard specimen of the puzzle. He also reported that the *complete* factorisation of the numbers $N = 3^n + 1$, where $n = 6\nu + 3$, had now been effected by the joint work of Mr. C. E. Bickmore and himself for the following values of n (51, 57, 69, 75, 81, 93 in part, 99, 105), thus *completing* the factorisation of these numbers up to $n = 105$ (except 93 in part), those from $n = 3$ to 45, 63, 87 being previously known. These numbers include several high primes of 9, 10, 11 figures.—The President communicated a paper, by Mr. H. G. Dawson, on the numerical values of $\int_0^h e^{x^2} dx$; and one by Prof. H. Lamb, F.R.S., on the reflection and transmission of electric waves by a metallic grating. Impromptu remarks were made by the President (in connection with the figure of Pascal's theorem) and by Mr. F. S. Macaulay.

Zoological Society, May 17.—W. T. Blanford, F.R.S., Vice-President, in the chair.—Mr. Oldfield Thomas read a paper on a small collection of Mammals from Nyasaland that had been presented to the British Museum by Mr. Alfred Sharpe, C.B. Sixteen species were enumerated, mostly from North Nyasaland. Among them was a new antelope from Urori, coloured like *Cephalophus æquatorialis*, but with horns in the female, as in *C. monticola*.—A communication was read from Dr. A. G. Butler on a collection of Lepidoptera lately made in British East Africa by Mr. C. S. Betton. It contained examples of 123 species of butterflies and of 111 species of moths. Among the moths were forms which were referred to five new genera, viz. *Bettonia*, *Aclonophlebia*, *Trotonotus*, *Hameopis*, *Lembopteris*, and *Metaculasta*. Besides these new genera thirty new species were characterised in this paper.—Mr. F. E. Beddard, F.R.S., communicated a paper by Miss Sophie M. Fedarb on some earthworms from India. Four species were treated of in this paper, of which the following three were described as new:—*Perichæta cupulifera*, *P. crescentica*, and *Dichogaster parvus*.—Mr. W. E. de Winton described a new rodent of the family Anomaluridæ from the Benito River, French Congo, which was referred to a new genus *Aethurus*, differing from both *Anomalurus* and *Idiurus* in not having any expanded flying-membranes, but resembling the former in the formation of the tail, and being more like the latter in the form of the skull. The species, proposed to be named *Aethurus glirinus* was of the same size as *Anomalurus batesi*, grey in colour, with a black bushy tail and a thickening of the skin of the lower leg, in which are set jet-black, club-shaped hairs forming anklets.—A communication was read from Mr. Stanley S. Flower, in which he pointed out that the gecko from Penang described by Stoliczka as *Cyrtodactylus affinis* and that described by himself under the name of *Gonatodes penangensis* were identical, and that the proper appellation of the species would be *Gonatodes affinis*.

Royal Meteorological Society, May 19.—F. C. Bayard, President, in the chair.—Mr. R. H. Scott, F.R.S., read a paper on the frequency of rainy days in the British Islands. He had taken the number of rainy days in each month at forty stations for the twenty years 1876-95, and then divided that number by the total number of days in the month, and so ascertained the resulting percentage. The greatest excess of frequency is always on the extreme north and west coasts. June is the month with the least number of rainy days, but in July the summer maximum of rain occurs, bringing the well-known Lammas floods. In October the weather becomes decidedly showery, and the distribution begins to assume its winter type. November is the month with the greatest frequency of rainy days.—Mr. F. J. Brodie read a paper on the abnormal weather of January last, which was one of the most remarkable winter months on record. The month was singularly dry, with an absence of snow or sleet—a somewhat unusual feature in January even for any individual station, but far more remarkable as applying to the country as a whole. The special feature, however, was the striking absence of severe frost, the frequent prevalence of unusually mild weather, and as a result the abnormal warmth of the month, especially in the more northern parts of the kingdom. The mean temperature was generally over the whole country about 5° above the average, while at many places situated in the more northern parts of the kingdom it was more than 6° above the average. The atmospheric pressure throughout the month was also very high, the mean being from two to three tenths of an inch above the average.

CAMBRIDGE.

Philosophical Society, May 2.—Mr. F. Darwin, President, in the chair.—On the theory of order, by Mr. E. T. Dixon. All the theorems of non-metrical (projective) geometry depend solely on the conception of "order" so defined as to be independent of the idea of "before or after," which belongs only to time. It follows from this definition that no "order" can be ascribed to less than four units in any uniform group: and this is why less than four points have no "projective relation" or an harmonic ratio. The paper further discusses the way in which numbers (or coordinates) may be assigned to the units of a group for purposes of analysis, with or without a system of "unique" lines having already been determined.—On the representation of a function, by Mr. H. F. Baker.—On the total eclipse of the sun, January 22, 1898, by Mr. H. F. Newall. A general account was given of the observations made during the recent eclipse, and photographs were exhibited, showing: (1) the general appearance of the corona; (2) the spectrum of the sun's limb as photographed with prismatic cameras by Sir Norman Lockyer's party, and by Mr. Evershed; (3) the spectrum of the sun's limb as photographed with a slit spectroscope.—Captain E. H. Hills, R.E., exhibited and described the photographs obtained by him of the spectrum of the corona; and also the two series of photographs of the spectrum of the sun's limb at the beginning and end of totality.

PARIS.

Academy of Sciences, May 16.—M. Wolf in the chair.—The Secretary announced to the Academy the loss it had sustained by the death of M. Souillart, Correspondant in the Section of Astronomy.—On the impossibility of certain series of groups of points on an algebraic surface, by M. Émile Picard.—On some causes of uncertainty in the exact estimation of carbonic acid and of water vapour, diluted with large volumes of air or inert gases, by M. Armand Gautier. It is shown that potash, even when spread over long columns of glass beads, is incapable of removing the last traces of carbon dioxide from air. This, however, is readily accomplished by the use of a U-tube containing moistened baryta. The increase of weight of a phosphoric anhydride tube after passing through it large volumes of air dried over sulphuric acid was also determined the amount being of the order of 0·4 mgr. for 100 litres of air. An attempt was made to estimate the maximum amount of sulphuric acid vapour carried away by 100 litres of air, and the conclusion drawn that at ordinary temperatures the vapour pressure of sulphuric acid in air must be less than one twenty-millionth.—On an absolute actinometer, by M. A. Crova. The instrument described is a modification of those proposed by M. Knut-Angström and M. Chwolson, consisting of a thin disc of pure copper, suitably protected from accidental radiations, and placed normally to the sun's rays, the temperature being measured by the resistance of a thin constantin wire.—Agglutination of the bacillus of true tuberculosis, by M. S. Arloing. Certain serums have the power of causing the bacilli of true human tuberculosis to cohere. An attempt will be made to see whether this property can be applied to the diagnosis of tuberculosis in man, analogous to the method now used for typhoid fever.—On the development of the disturbance function, by M. Adrien Féraud.—On the quadratic and rational correspondence of two plane figures, and on a remarkable substitution, by M. Ernest

Duporcq.—On the Hamiltonian groups, by M. G. A. Miller.—On the liquefaction of hydrogen and of helium, by M. James Dewar (see NATURE, p. 55.) On a Crookes' tube which can be revivified by osmosis, by M. P. Villard. A platinum tube is fixed to one end of the glass part of a Crookes' tube. When after repeated use the resistance of the tube becomes too high, the platinum tube is heated with a Bunsen burner, the hydrogen of the flame penetrates the tube, and in two or three seconds the tube is fit for use again.—On a property of fluorescent screens, by M. P. Villard. If an object is placed between the Crookes' tube and the screen, the latter illuminated for some time, and then the object removed, it is found that those parts of the screen previously protected by the interposed object are more luminous than the others —On the molecular weights of the easily liquefiable gases, by M. Daniel Berthelot. Starting with the theorem that the molecular weights of gases are proportional to their limiting densities when the pressure is infinitely small, from the experiments of M. Leduc, the true density ratios of oxygen, carbon droxide, nitrous oxide, hydrochloric acid, acetylene, phosphoretted hydrogen, and sulphur dioxide are determined, the precision being, in the opinion of the author, equal to that obtained by the best chemical methods.—On the preparation and properties of anhydrous beryllium fluoride, and the oxyfluoride of beryllium, by M. P. Lebeau. The product obtained by drying in air the substance given by the solution of beryllium hydrate in hydrofluoric acid is an oxyfluoride, $5BeF_2.2BeO$, and the anhydrous fluoride cannot be obtained in this way. The latter, however, can be obtained in the pure state if the drying be conducted in a stream of gaseous hydrogen fluoride.—On a method of preparing potassium carbonyl-ferrocyanide synthetically, by M. J. A. Muller. Potassium ferrocyanide, heating in closed vessels with carbonic oxide at 130°, gives in less than forty-eight hours 90 per cent. of the theoretical yield of $K_3Fe(CN)_5CO$.—On a new unsaturated tertiary alcohol, dimethylheptenol, by M. Ph. Barbier.—Ethane-pyrocatechol and its derivatives, by M. Ch. Moureu.—On the presence of the common eel in the open sea, by M. Leon Vaillant. The eel was found in the stomach of a sperm whale, and is of interest in furnishing an undoubted proof that the eel descends to the sea.—On the development of *Alpheus minor*, by M. H. Coutière.—Origin of the structure of lenticels, by M. Henri Devaux. The observations given show that the lenticel is a small region continually accommodating itself to the conditions of external moisture.—On the origin of the thallus of the Cutleriaceæ, by M. C. Sauvageau.—On the *Septoria graminum*, destroying the leaves of wheat, by M. L. Mangin.—Insertion of the base of the nerve fibre on the limiting margin of an adult nerve axis, in the form of a continuous epithelial sheet, by M. J. Renaut.—Some micro-organisms of soured wines, by MM. F. Bordas, Joulin and de Raczkowski.—Some periscopic glasses, by M Ostwalt.—Variations in the pressure and horizontal components of the wind governed by the moon. Discussion of the formulæ: generation of depressions, by M. A. Poincaré.—Earthquakes of May 6, 1898, documents by M. Jullien of Chambéry, M. Guerby of Annecy, M. André of Saint-Genis-Laval, and M. Soret of Geneva, communicated by M. Mascart.

DIARY OF SOCIETIES.

THURSDAY, May 26.

Royal Society, at 4.30.—On the Cytological Features of Fertilisation and Related Phenomena in *Pinus silvestris L.*: V. H. Blackman.—The Skeleton and Classification of the Calcareous Sponges: G. P. Bidder—On Surfusion in Metals and Alloys: Prof. Roberts Austen, F.R.S—Note on the Complete Scheme of Electrodynamic Equations of a Moving Material Medium, and on Electrostriction: Dr. J. Larmor, F.R.S.—Aluminium as an Electrode in Cells for Direct and Alternate Currents: E. Wilson.—Contributions to the Study of "Flicker": T. C. Porter.—On the Kathode Fall in Gases: Dr. Capstick.

Royal Institution, at 3.—Heat: Lord Rayleigh.

Institution of Electrical Engineers, at 8.—The Design of Electric Railway Motors for Rapid Acceleration: Prof. Charles A. Carus-Wilson.

FRIDAY, May 27.

Royal Institution, at 9.—Sir Stamford Raffles and the Malay States: Lieut.-General the Hon. Sir Andrew Clarke.

Physical Society, at 5.—A Simple Interference Method of Reducing Prismatic Spectra: Mr. Edser and Mr. Butler.—Some further Experiments on the Circulation of the Residual Gaseous Matter in Crookes' Tubes Campbell Swinton.

SATURDAY, May 28.

Royal Institution, at 3.—The Biology of Spring: J. Arthur Thomson.

Geologists' Association (Liverpool Street Station, G.E.R.), at 11.45.—Long Excursion to Aldeburgh and Westleton. Directors: W. Whitaker, F.R.S., F. W. Harmer, and E. P. Ridley.

WEDNESDAY, June 1.

Entomological Society, at 8.—The Lepidoptera Heterocera of China and Japan: J. H. Leech.—The Moths of the Lesser Antilles: Sir Geo. F. Hampson, Bart.

THURSDAY, June 2.

Royal Institution, at 3.—Modern Methods and their Achievements in Bacteriology: Dr. E. E. Klein.

Linnean Society, at 8.—Notes on some Lories: Prof. St. George Mivart, F.R.S.—A Revision of the Genus Symblepharis: E. J. Salmon.—On the Food of the Uropoda: Surgeon-Captain H. A. Cummins.

Chemical Society, at 8.—The Action of Ether on Organic Acids and on Carbohydrates in Presence of Hydrogen Bromide: H. J. H. Fenton and Mildred Gostling.

FRIDAY, June 3.

Royal Institution, at 9.—The Development of the Tomb in Egypt: Prof. W. M. Flinders Petrie.

Geologists' Association, at 8.—Fossil Sharks and Skates, with special reference to those of the Eocene Period: A. Smith Woodward.

SATURDAY, June 4.

Royal Institution, at 3.—The Temples and Ritual of Asklepios at Epidaurus and Athens: Dr. R. Caton.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Books.—Electro-Dynamics: Prof. C. A. Carus-Wilson (Longmans)—Bulletin of Miscellaneous Information, 1897 (Darling).—The Scientific Memoirs of Thomas Henry Huxley, edited by Profs. M. Foster and E. Ray Lankester. Vol. 1 (Macmillan).—Creation Records discovered in Egypt: G. St. Clair (Nutt).—Catalogue of the African Plants collected by Dr. F. Welwitsch in 1853-61: W. P. Hiern, Part 2 (British Museum)—List of the Types and Figured Specimens of Fossil Cephalopoda in the British Museum (Natural History): G. C. Crick (British Museum).—Elements of Descriptive Astronomy: Prof. H. A. Howe (Philip)—Manual Training: Woodwork: G. Ricks (Macmillan).—A Simplified Euclid Book I: W. W. Cheriton (Rivingtons).—Syllabus der Pflanzenfamilien: Dr. A. Engler, Zweite, umgearbeitete Ausgabe (Berlin, Borntraeger).—Die Vegetation der Erde. II. Grundzüge der Pflanzenverbreitung in der Karpathen: F. Pax, I. Band (Leipzig, Engelmann)

Pamphlets.—Per la Storia della Meteorologia in Italia: P. G. Boffito (Torino)—Essai sur la Théorie des Machines Electriques a Influence: Prof V. Schaffers (Paris, Gauthier-Villars)—Versuch einer Darstellung der Empfindungen: W. Přibram (Wien, Hölder)

Serials.—Journal of the Chemical Society, May (Gurney).—Zoologist, May (West).—Himmel und Erde, Mai (Berlin).—History of Mankind: F. Ratzel, translated, Part 26 (Macmillan).—Bulletin de l'Académie Royale des Sciences, &c., de Belgique, 1898, No 4 (Bruxelles).—Memoirs and Proceedings of the Manchester Literary and Philosophical Society, Vol. 42, Part 2 (Manchester)—L'Anthropologie, Tome ix. No. 2 (Paris).—Monthly Weather Review, February, (Washington).

CONTENTS.

PAGE

Modern Physiology from the Chemical Standpoint. By Dr. T. H. Milroy 73
Vegetable Organography. By H. H. D. 74
A Great North Road 75

Our Book Shelf:—

Fischer: "Vorlesungen über Bacterien" 76
Kollmann: "Lehrbuch der Entwicklungsgeschichte des Menschen" 77
Missouri Botanical Garden 77

Letters to the Editor:—

Liquefaction of Hydrogen.—**Dr. W. Hampson** . . 77
Concerning the Thermodynamic Correction for an Air-Thermometer.—**John Rose-Innes** 77
Printer's Ink and Photographic Plates.—**Rev. F. J. Jervis-Smith, F.R.S.** 78
Heavy Rainfalls.—**C. Drieberg** 78
Hermaphroditism in the Apodidæ.—**Henry Bernard** 78
Magnetism and Sun-spots. (*With Diagrams.*) **By William Ellis, F.R.S.** 78
Monographs of the United States Geological Survey. By H. B. W. 81
Anthropology in Madras. (*Illustrated.*) **By Edgar Thurston** 82
Notes 84

Our Astronomical Column:—

Astronomical Occurrences in June 88
Blurring Aberration in the Telescope 88
Photography by the Aurora Borealis 88
Mr. Tebbutt's Observatory 88
Some New Studies in Kathode and Röntgen Radiations. (*Illustrated.*) **By Alan A. Campbell Swinton** 88
University and Educational Intelligence 92
Scientific Serials 92
Societies and Academies 93
Diary of Societies 96
Books, Pamphlets, and Serials Received 96